APPARATUS AND METHOD FOR REDUCING TRANSMISSION NOISE INTEFERENCE OF SCANNER

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates in general to an apparatus and a method for transmission noise interference reduction. More particularly, the invention relates to an apparatus and a method to reduce the transmission noise interference of a scanner.

Related Art of the Invention

[0002] Figure 1 shows a block diagram of a conventional scanner. The charge coupled device (CCD) 102 transmits the image analog signal to the analog-to-digital converter (ADC) 106 via the charge coupled device cable 104. The analog signal is converted into a digital signal, and the recovered digital signal is transmitted to the application specific integrated circuit (ASIC) 108 for processing before being output. As the amount of data the resolution of the image increase, most of the signals output from the charge coupled device 102 are high frequency analog signals. In the process of transmitting the image analog signal to the analog-to-digital converter 110 via the charge coupled device 102, the analog signal is easily interfered with by external noise due to its high frequency. When the length of the transmission cable is too long, a noise is easily caused to distort the signal.

SUMMARY OF THE INVENTION

[0003] The invention provides an apparatus to reduce the transmission noise interference of a scanner, so that the problem of noise interference is resolved.

[0004] The apparatus to reduce the transmission noise interference of the scanner comprises a charge coupled device, a shield circuit and a charge coupled device cable. The charge coupled device converts the detected light intensity into a photocurrent by photoelectric conversion. The photocurrent is stored in the electrode, transformed into a signal charge and converted into various potential differences to output an analog signal. The shield circuit is coupled to the charge coupled device to filter the unwanted analog signal output from the charge coupled device, and to reserve the required analog signals. The charge coupled device cable is coupled to the shield circuit to transmit the required analog signals.

[0005] In the above embodiment, the shield coupled to the charge coupled device and the charge coupled device cable include a multiplexer and an AND gate. The multiplexer is coupled to the charge coupled device and is used to output a shield signal. The AND gate is coupled to the charge coupled device. The multiplexer and the charge coupled device apply the shield signal, so that unwanted analog signals are filtered and the required analog signals are reserved.

[0006] The above shield signal is an adjustable signal. At a high potential, the required analog signal is retained, and at a low potential, the unwanted analog signals are filtered out.

[0007] The invention also provides a method to reduce the transmission noise interference for a scanner. In the above method, a shield signal is used to filter the

unwanted analog signal and retain the required analog signal during the signal transmission process of a scanner.

[0008] Thus, the unwanted analog signals are filtered away to leave only the required analog signals. The frequency of the analog signals is also reduced; that is, it is less likely to be interfered with by the noise.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] These, as well as other features of the present invention, will become more apparent upon reference to the drawings wherein:

[0010] Figure 1 shows a block diagram of the conventional scanner;

[0011] Figure 2 shows a block diagram of a scanner applying the apparatus provided by the invention;

[0012] Figure 3 shows the signal diagram of Figure 2; and

[0013] Figure 4 shows an embodiment of the shield circuit.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0014] Figure 2 shows a block diagram of a scanner applying the apparatus provided by the invention. The scanner comprises a charge coupled device 120, an analog-to-digital converter 106, a charge coupled device cable 104, an application specific integrated circuit (ASIC) 108, an analog-to-digital converter 106, a memory 110 and an input/output (I/O) port 112. The charge coupled device 120 is coupled to the charge coupled device cable 104. The application specific integrated circuit 108 is coupled to the analog-to-digital converter 106. The memory 110 is coupled to the application specific integrated circuit 108. The input/output port 112 is coupled to the

application specific integrated circuit 108. The unwanted analog signals of the image analog signals are filtered away by the shield circuit 204 of the charge coupled device 202, while only the required analog signals remain. Referring to Figure 3, the signal diagram generated by the apparatus in Figure 2 is illustrated. ϕ_1 and ϕ_2 are the operation frequencies for image transmission of the charge coupled device 202. The charge coupled device 202 transmits the image analog signal *Vout* to the shield circuit 204, which then outputs an adjustable shield signal *mask* to *Vout*. When the signal *mask* is at a low level, the unwanted signal of the *Vout* is filtered. When the signal *mask* is at a high level, the required signal *voutmask* remains and is transmitted to the analog-to-digital converter 208 via the charge coupled device cable 206. The analog signal is converted into a digital signal, which is then recovered and transmitted to the application specific integrated circuit 210 for processing, and then output from the input/output port 112.

[0015] In Figure 4, an embodiment of the shield circuit is illustrated. The multiplexer 402 generates an adjustable shield signal *mask* to the AND gate 404. After receiving the shield signal *mask* from the multiplexer 402 and the receiving signal *vout* of the charge coupled device, the shield signal *mask* is used to remove the unwanted part of the shield signal *vout* to generate a signal *voutmask* with a lower frequency. Since the output frequency is lowered, it is thus less likely to be interfered with by noise.

[0016] According to the above, the invention has the following advantages. The unwanted analog signal of the charge coupled device is filtered out, while the required analog signal is retained. As a result, the frequency of the analog signal is reduced without being easily affected by the noise interference.

[0017] Other embodiments of the invention will appear to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples to be considered as exemplary only, with a true scope and spirit of the invention being indicated by the following claims.